U.S. DEPT.OF AGRICULTURE. WEATHER BUREAU

The climate of Porto Rico. [1911]

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THE CLIMATE OF PORTO RICO.*

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INTRODUCTION.

For more than 2,000 years geographers have recognized three climatic divisions or zones—the torrid, the temperate and the frigid; or, as they are now commonly called, the tropical, the temperate and the polar zones of the earth. These terms are convenient, and as appropriate as any single terms which can be found; but they describe only the most general characteristics of their respective zones. The early geographers taught that the torrid and the frigid zones were not habitable, one because of too great heat, the other because of unbearable cold, and that the temperate, or middle zone, alone was fit for human habitation. The navigators of the 16th century were able to ridicule these teachings, and more enlightened ideas soon began to prevail. What is known as the temperate zone embraces practically all variations of climate, from the coldest to the hottest, and from the driest to the wettest. It includes as its northern limit the cold pole of the earth, in northern Siberia, where the average temperature of mid-winter is 50° below zero; it also includes near its southern limit portions of the great desert of Sahara, with an average July temperature of about 95°. In spite of these great extremes of temperature, those portions of the zone which are occupied by the great mass of civilized peoples, may be said to have on the whole temperate climatic conditions.

The term torrid, as applied to the climate of the central zone of the earth, between the parallels of the tropic of Cancer and the tropic of Capricorn, is almost as misleading as the use of the word temperate to describe the climatic conditions of the middle latitudes. In area the torrid, or tropical, zone embraces nearly 50 per cent of the entire area of the earth's surface, and includes a great variety of climates. The temperature contrasts are not so great as those of the temperate zone, but they may be considerable over limited areas at great elevations, combined with a dry atmosphere. On the whole, however, the zone is warm and moist, and relief from oppressive conditions must be sought in elevation and in regions of more than the average wind movement—such as the trade-wind belts, or within the influence of the local land and sea breezes, which prevail along the coasts.

Our ideas concerning the healthfulness of extreme climates have undergone a radical change in recent years. Actual temperature and moisture conditions are not so much the determining factor as strict enforcement of sanitary regulations. Climates which were, not many years ago, considered highly injurious and unfit for the permanent residence of the white man, have been shown to be not only safe, but perfectly healthful. The marvelous improvement in the healthfulness of the Panama Canal Zone, brought about by the intelligent efforts of the American engineers, in a region where thousands of working men perished annually under less efficient care, is a striking illustration of the minor part played by actual climatic conditions.

General Characteristics.—The most characteristic feature of tropical climates is the regular recurrence of similar phenomena from day to day, throughout the year. The strong contrasts in temperature, which mark the seasons of the north, with the accompanying variations in the abundance and character of plant life, are conspicuous by their absence in the tropics. The periodic recurrences in plant and animal life are determined more by rain or the absence of rain than by marked changes in temperature. The contrast between day and night conditions are more marked than the seasonal contrasts. The irregular changes in the weather, such as storms, cold waves, hot waves, etc., which largely control weather conditions in the United States, are so infrequent in the lower latitudes as to cut but a small figure in the making up of the average of weather conditions. Next to uniformity in the tropics we have the factor of abundance—abundant heat, rather than excessive heat; abundant moisture, both in the form of a high humidity and of rainfall, and abundant and perennial plant and animal life.

When we come to consider the place which Porto Rico occupies in this favored zone of plenty, we find to her credit an attractive combination of many desirable physical and climatic features, especially for the planter and for the tourist. The Island is primarily an agricultural country. Each succeeding year witnesses an increasing acreage in sugar, tobacco, coffee, citrous fruits and pineapples. The great natural beauty of the Island, its splendid system of macadamized roads, and the ideal winter climate, will some day attract the ever-increasing throng of winter tourists. With over a million inhabitants, and with a density of population equal to that of Massachusetts, the healthfulness of the Island, based on the mortality statistics, ranks with that of Boston, New York and Baltimore. The geographical position of the Island within the trade-wind belt, combined with its high elevation above the sea level, mark it as one of the most favored regions within the tropics.

TOPOGRAPHY.

The Island of Porto Rico is the smallest and most eastern of the Greater Antilles, which form the northern barrier to the Caribbean Sea. Lying between the parallels of 18° and 19° north latitude, the position of the Island, with reference to the equator, is approximately that of Jamaica, St. Thomas and the Hawaiian Islands. In form Porto Rico is nearly rectangular, with an average east-west length of about 100 miles and a width of 35 to 40 miles; hence the area is less than 4,000 square miles, about 25 per cent less than that of the the State of Connecticut.

While the physical features of the Island seem never to have been accurately charted, the more conspicuous outlines of topography and hydrography are fairly well known. Seen from a distance the Island gives the impression of a confused mass of short mountain ranges, having in the main an east-west trend. Closer examination reveals a well-defined ridge, the Cordilleras, extending across the full length of the Island, parallel to, and from 10 to 12 miles from, the south coast, its eastern end following for a short distance the northeast trend of the coast line. In the northeast portion of the Island there is a smaller group of mountains, the Luquillo Range, also with

* Based upon observations of the United States Weather Bureau.

an east-west trend, and with peaks slightly higher than those of the main range. These two mountain ranges form the principal watershed, which separates the system of short streams which flow southward into the Caribbean Sea from the system of comparatively longer and more numerous streams flowing in a general direction northward into the Atlantic Ocean. The longest of the streams, Rio de la Plata, does not exceed 45 miles. Numerous spurs diverge from the main ranges, mostly from the north side, forming a complex system of narrow ridges, and of deep valleys through which hundreds of small streams carry the waters of an abundant rainfall rapidly to the sea. The south slope of the main divide is decidedly more precipitous than the north side: From Guayama pass southward to the coastal plain the descent is about 100 feet per kilometer; northward the rate is about 50 feet per kilometer. The main divide has an average elevation of about 2,500 feet, with peaks rising to a maximum, in the Luquillo range, of about 3,500 feet, while the elevations of the main spurs will vary from 1,500 to 2,000 feet. The lowlands are found only in a narrow belt bordering the coast, the broadest stretches not exceeding four or five miles in width.

The average elevation of the Island as a whole, above sea-level, is perhaps 800 feet. Of the fifty climatological stations established by the United States Weather Bureau, twenty are on the coastal plain with an average elevation above the sea of less than 100 feet; the inland stations, numbering about thirty, have an average elevation of 1,000 feet, with a maximum of 2,600 feet.

The well-watered mountain slopes are covered with a dense perennial tropical growth. In the more inaccessible regions of the Luquillo Range, within the proposed National Forest Reserve, may still be found in considerable quantity primitive growth of valuable hard-wood timber, such as ausubo, laurel, tabanuco, and guaraguao. The Luquillo region, with its rich tropical growth of palms, tree ferns, mosses and air plants, its many peaks and deep ravines, its innumerable clear mountain streams and beautiful waterfalls, offers a rich field for the naturalist and for the tourist who is inclined to wander from the beaten paths of conventional travel.

The Island has always been, and will probably continue to be, devoted primarily to the pursuit of agriculture. The coastal plain and the foothills are planted to sugarcane, citrus fruits and pineapples; the mountain sides are planted extensively to coffee and tobacco; while good pasture lands are found in all portions of the Island. The relative importance of the industries is readily seen in the statistics representing the value of exports during the year 1909: With a total value of all industries placed at thirty-seven millions of dollars, twenty-one millions are represented by sugar and molasses, six millions by tobacco in its various forms, and five millions by coffee, leaving but five millions for "all other industries," including fruits, nuts, hides, manufactures, etc.

TEMPERATURE.

Porto Rico, in common with all islands within the areas swept by the northeast and southeast trade winds, has a warm but equable and comfortable climate. The small extent of the Island, with its moderate elevations above sea-level, insures a uniformity of temperature characteristic of marine climates in all latitudes. The series of carefully made daily observations of the United States Weather Bureau in fifty selected localities upon the Island cover a period of more than ten years, a period sufficiently long, in the tropics, to include all the variations in temperature likely to be experienced in any portion of the Island. In considering temperature records it is well to bear in mind that observations, in order that they may be comparable, are always made in the shade, uninfluenced by the direct rays of the sun. This is a matter of special importance in comparing observations made within the tropics, where solar radiation is so intense, and the difference between shade and sunshine so much more noticeable than in the middle latitudes.

The simplest expression for the temperature of a given region is the average temperature for a series of years, usually derived from daily observations of the highest and lowest readings of a good thermometer. Such a record covering a period of more than ten years at over forty selected stations shows a mean annual temperature for the Island, combining the records at all stations, of 76°; during the coolest month of the winter season the average is 73°, and during the warmest month of summer it is 79°. The variation of the mean annual temperature has very restricted limits, having varied only about 1° above and below 76° in the past ten years. The average temperature during the month of February, which shows the greatest variation, has fluctuated only between the limits of 75° and 71°.

The above values represent average conditions for the Island as a whole, coast stations and mountain stations combined. The figures will vary somewhat with elevation and other topographic conditions. For the towns situated upon the narrow coastal plain encircling the Island the average annual temperature is 78°, the average for January 75°, and for August 81°; at inland stations the average annual falls to a minimum of 72°, with 69° during January and 75° during August. The lowest temperatures are naturally those experienced along and near the summit of the main divide, at elevations varying from 2,000 to 3,000 feet; here the mean annual temperature falls below 72°. At Aibonito the mean temperature for the year is 72°, with a January mean of 67° and a mean for August of 76°. The highest mean temperature for August in five years was 77° and the lowest January mean was 66°.

The Island of Porto Rico has a mean temperature below that of places in the tropics having the same latitude, as shown by the following figures:

NORMAL TEMPERATURES FOR THE PARALLEL OF 18 DEGREES NORTH LATITUDE AND OF PORTO RICO.

	18 degrees N. lat.	Porto Rico.	Difference.
January	73.4 degrees.	73.2 degrees.	0.2 degree.
July	82.4 degrees.	78.8 degrees.	3.6 degrees.
Year	78.8 degrees.	76.4 degrees.	2.4 degrees.

The values quoted in the preceding paragraph may be compared, in the following table, with average values for the same seasons at selected points in the West Indies and at more remote points in the United States and elsewhere:

TABLE I.—COMPARATIVE STATEMENT OF TEMPERATURES.

Locality.	Mean annual temp.	Mean warmest month.	Mean coolest month.	Average daily range.	Highest recorded.	Lowest recorded.
	Degrees.	Degrees.	Degrees.	Degrees.	Degrees.	Degrees.
Manila, P. I.	80	84	77	12	100	60
Colon, Panama	80	80	79	8	*95	*64
Barbadoes	79	81	77	.....	.....	.....
Kingston, Jamaica	78	81	75	17	97	57
San Juan, Porto Rico	78	81	75	11	94	63
Key West, Fla.	77	85	70	10	100	41
Havana, Cuba	77	82	71	11	100	53
Nassau, Bahamas	77	83	71	12	98	53
Porto Rico (entire Island).	76	79	73	19	103	43
Honolulu, H. I.	74	78	70	10	88	52
Aibonito, Porto Rico.	72	76	67	24	91	43
Bermuda	69	79	62	.....	.....	.....
New Orleans, La.	69	83	54	15	102	7
Los Angeles, Calif.	62	72	54	20	99	32

*Average values.

The smallest variations in the mean temperature noted in the tropical localities of the above table are characteristic of the islands within the trade-wind belts. They are due to the slight differences in the elevation of the sun from season to

season, to the small geographical extent of the land areas, and to the constant wind movement throughout the day and night. In the tropics the difference between the afternoon temperatures and the night temperatures is decidedly greater than the difference between the mean summer and mean winter temperatures, while in the higher latitudes the annual range in temperature in nearly all cases is larger than the diurnal range. Relief from the heat of the day in the tropics may almost always be found in the comparatively low night temperatures. During the middle of the day the sun's rays are tempered by the increasing force of the wind and by the decreasing relative humidity, which always accompanies a rising temperature.

San Juan has a more equable temperature than any other portion of the Island, due to the fact that the city is almost surrounded by water—the ocean to the north and the harbor to the south. But few of the cities and towns of Porto Rico were built upon the immediate coast; the coastal plain towns have their "playas" or beeches, but the towns themselves were located two or more miles inland, beyond the reach of chance shots from passing vessels of the early days of the Island. Hence the temperature records of the coast towns show a diurnal range much greater than that of San Juan. The inland stations show a much larger difference between the early morning and the afternoon temperatures.

To those accustomed to the strong climatic contrasts of the northern latitudes, the differences between winter and summer temperatures in the tropics seem small and insignificant; they are, however, large enough to make a decided difference in personal comfort, especially at inland stations.

January is, on the whole, the coolest month of the year, although there is but a fraction of a degree difference between the mean values of January and February. From March there is a steady rise in the mean temperature, until a maximum is reached in August, generally, although frequently in July or in September. The differences between the mean temperatures of July, August, September and October, are very slight, and probably are due to differences in the rate of wind movement, or variations in the amount of cloudiness. During the winter months the mean daily temperature is 75° to 76° along the coast, decreasing to 74° over most of the coastal plain. At stations farther inland the mean temperature ranges between 72° and 68°, depending upon the elevation above sea-level. During the summer and early fall the mean temperature along the coast is 80° to 81°, although it frequently rises to 82° or 83° along the southeast coast. At the more elevated stations the mean summer temperatures vary from 76° to 74°. There is a fairly constant difference of 6° to 8° between the coast temperatures and those of the higher inland stations throughout the year.

Afternoon and Early Morning Temperatures.—While the mean daily temperature does not vary greatly from month to month, the differences between the afternoon and early morning temperatures, or the daily range, as it is called, is comparatively large—larger as a rule than in more northern regions. At stations on the immediate coast, like San Juan, or on the smaller islands of Culebra and Vieques, the diurnal range is controlled by the uniform temperature conditions of the surrounding ocean, and is quite small—10° or 11°. At inland stations the mean daily range varies from 20° to 25°. At stations along or near the coast the afternoon temperature rises to an average of 84° in the winter months, and to 89° in the summer months, while the early morning temperatures fall to 73° in the summer and to 66° in the winter seasons. At stations farther inland, in the hills and mountains, the average daily maximum is about 87° in the summer months and 81° in the winter months, while the average daily minimum is 68° in summer and 61° in winter. See Table II—Average daily and monthly fluctuations in temperature:

TABLE II.—AVERAGE DAILY AND MONTHLY FLUCTUATIONS IN TEMPERATURE. (In degrees Fahrenheit.)

Stations.	Elevation.	Daily fluctuations.					Monthly fluctuations.				
		January.		July.		Year.	January.		July.		Year.
		Max.	Min.	Max.	Min.	Daily range	Max.	Min.	Max.	Min.	Mon. range
Coast stations:	ft.										
San Juan	82	80	70	86	75	11	84	57	88	71	19
Fajardo	60	85	68	88	75	14	87	63	91	71	24
Ponce	50	85	64	90	72	19	87	60	93	67	26
Mayagüez	50	86	62	90	68	23	89	58	93	65	29
Inland stations:											
Aibonito	2,000	76	58	84	68	19	81	57	86	64	30
Barros	2,000	77	58	86	67	19	82	51	90	62	31
Cayey	1,400	81	59	88	68	22	85	51	93	63	33
Lares	1,400	83	58	90	64	25	86	53	92	60	32
Coamo	250	86	62	91	70	23	90	57	94	66	31

The temperatures quoted in the preceding paragraphs are average values, and express the normal march of temperature from day to day and from month to month during a period of about ten years. While average values vary greatly from the actual temperatures experienced in northern and middle latitudes, especially at stations far removed from the coast, this is not generally true of tropical temperatures, particularly on the smaller islands, like Porto Rico, in the trade-wind belts; here large departures from the normal values are exceptional, and the figures representing average values do not differ widely from those expressing actual temperatures experienced from day to day. To one accustomed to variations of 15° to 20° and more in the average temperature from day to day, differences of a degree or less for many successive days seem remarkable.

The extremes of temperature recorded at selected stations in Porto Rico during the past ten years are noted on Chart No. 1. More detailed data on temperature conditions may be found in the recently published tabular statements in the monthly climatological reports of the Porto Rico Section of the United States Weather Bureau. The highest temperatures recorded during the past ten years in Porto Rico do not differ greatly in different portions of the Island; at the more elevated inland stations the range is between 90° and 95°, while along the coast and in the valleys they range from 95° to 100°. On only three occasions in the past ten years has a temperature exceeding 100° been recorded at any of the forty-odd stations on the Island: In August, 1906, a maximum of 103° was reported from San Lorenzo, in the east-central portion of the Island, and again in September of the same year a temperature of 101°; in September, 1908, the observer at Arecibo, on the northwest coast, reported a temperature of 101°.

There is a greater variation in the early morning temperatures: At the stations near the coast and at most of the interior stations, the lowest recorded temperatures range between 50° and 55°; at stations on the immediate coast, which are more under the influence of the uniform ocean temperatures, the minimum rarely falls below 60°; at higher stations in the mountains the minimum frequently falls to 45°, and has been as low as 43° at Aibonito, at an elevation of 2,000 feet, and probably lower at greater elevations along the summit of the main divide.

RAINFALL.

The average annual rainfall for the entire Island is 77.30 inches. This value is based upon the records of 44 stations, covering a period of twelve years. The annual amounts vary greatly from year to year, and in geographical distribution. In 1901 the average amount for the Island as a whole was 93.72 inches, and in 1907, but 64.18 inches.

The variations in geograpical distribution are even greater: In the Luquillo Mountains, where rainfall is heaviest, the average annual amount exceeds 135 inches, with a maximum in 1901 of 169 inches; along portions of the south coast the average annual amount is less than 40 inches, with a minimum, at Aguirre in 1907, of 21 inches. At stations along and near the south coast the average annual rainfall is about 45 inches; along the north coast, the average is about 65 inches. Along the west coast the rainfall is greater, the annual fall being 75 inches, while along the east coast and at inland stations the average increases to 85 inches. These variations in the annual rainfall are due to differences of elevation, and to the trend of the mountain ranges with reference to the prevailing winds.

There are three well-defined areas of heavy rainfall, in each of which the annual amount exceeds 100 inches: (1) The Luquillo Range, a heavily wooded and comparatively inaccessible region in the northeast portion of the Island; (2) the peaks about Adjuntas, near the south-central part of the Island; (3) the mountains radiating from the western extremity of the main divide, in the vicinity of Las Marias and Maricao.

The most striking feature of the rainfall distribution is the contrast between the heavy and perennial rains north of the main divide and the light and irregular rains of the south-side coastal plain. Over the north side, comprising over two-thirds of the entire Island, an abundant rainfall may be counted upon in all seasons of the year, and protracted droughts are of rare occurrence; along the south coast the rainfall is not only comparatively light, but unevenly distributed throughout the year, and periods of several months with little or no rain are frequent.

The irrigation project now under construction along the south coast will in great measure overcome the disadvantages of an insufficient and irregular rainfall. In the mountains, but a few miles distant, there is an abundant water supply, available at all seasons of the year, which can be carried to the coastal plain at comparatively small cost. The main divide is to be tunneled at two points, and the headwaters of the La Plata and Toro Negro rivers will be carried across the divide to the cane fields on the south side.

There are no well-defined wet and dry seasons on the Island. The winter rains are comparatively light, with a minimum in February at practically all stations. From February there is a steady increase in the average monthly amounts through May. From May to November the differences in the average monthly amounts for the entire Island are small. The maximum generally falls in September along the east coast, in October along the south coast, in November along the north coast, while in the mountains of the interior the time of maximum occurs in one of the summer months or as early as May. The seasonal distribution of rainfall shows a steady increase, for the Island as a whole, from 11 inches in winter to 26 inches in autumn, with 16 inches for the spring months and 23 inches for the summer months, making up the total of 77 inches, in round numbers, for the average annual rainfall of the Island.

The rains of Porto Rico, while frequently very heavy, are usually of short duration. The average duration of a shower is probably not more than ten or twelve minutes, although on many occasions a series of intermittent showers will extend over a period of an hour or two. During the passage of a tropical hurricane, or when one of the more extensive north Atlantic storms passes eastward along a more southern route than usual, the period of continuous rainfall may be extended to several hours and even throughout the day, or there may be several successive days of unsettled weather with frequent showers. But such storms are of comparatively rare occurrence. During the past 40 years the centers of only three hurricanes have passed over the Island of Porto Rico, although they frequently pass near enough to cause heavy rains over some portion of the Island.

The average amount of rainfall upon days with rain is about half an inch; the rains of the winter months average somewhat less—from three- to four-tenths of an inch, and those of the summer and fall months somewhat more—from five- to six-tenths of an inch. Neglecting days with a rainfall of less than 0.01 inch, the average 24-hour rainfall varies from 0.26 inch at Caguas to 0.74 inch at Utuado; for San Juan the average is 0.30 inch. These average values are, however, greatly exceeded in individual cases. The heaviest rains recorded during a 24-hour period, since the establishment of the Climatological Service of the United States Weather Bureau in 1899, occurred during the passage of the hurricane of August 8, 1899, during the rainy periods of May and November, 1909, and during the local storm of September 6, 1910. The town of Adjuntas was in the center of the path of the hurricane of August, 1899; the local observer reported a rainfall of 23 inches in 23 hours, the heaviest 24-hour rainfall on record in Porto Rico. There are numerous records showing a more excessive rate of fall, but for shorter periods. During the storm of September 6-7, 1910, Naguabo reported a fall of 19 inches within a period of 12 hours. There are numerous instances of a fall of 10 inches in 12 hours, while amounts of 4 to 5 inches in 24 hours are of very frequent occurrence.

The variations in the recorded amounts of rainfall from year to year, and the means and extremes during the year, for the entire Island, are shown in Table VI. While heavy rains occur with comparative frequency, they form but a small percentage of the total number of rains during the course of the year. A tabulation of the rainfall records at 44 stations during a period of ten years shows the following relative frequency of stated amounts:

33	per cent of all rains measure	0.10 inch	or less.
50	" " " "	0.20 "	"
75	" " " "	0.50 "	"
90	" " " "	1.00 "	"

Thus there remain but 10 per cent to include all amounts greater than one inch. These percentages apply roughly to stations in all parts of the Island, after making an exception of amounts less than a tenth of an inch, for which the percentages vary greatly.

Rain occurs in some quantity, over some portion of the Island, practically every day in the year: it is probable that the month of February is the only month of the year having occasional periods of three or possibly four days without some rain somewhere within the Island. For the Island as a whole rain occurs on the average 169 days in every year. At Guayama, on the south coast, the average annual frequency is but 66, while the number rises to nearly 300 in the Luquillo Mountains. The minimum frequency in any one year was 28, at Guánica in 1907, while the maximum has been as high as 341, at La Perla, in the Luquillo Range, in 1900. The days with rainfall to the extent of 0.01 inch or more are distributed through the year with considerable uniformity, considering the Island in its entirety. The average monthly frequency varies between the narrow limits of 10 to 14 in the winter months, and 15 to 17 during the period from May to November. Along the southern coast the average annual number varies from 75 to 100; along the western and northern coasts, and generally in the interior, the average number of days with rain is about 175, and along the eastern coast the number exceeds 200. On the eastern slope of the Luquillo Mountains rain occurs on an average of nearly 300 days per year, as stated above, with a maximum of 341 in 1900. The variability in the fre-

quency of days with rain is shown for a few selected stations in the following Table III:

TABLE III.—RAINFALL AT SELECTED STATIONS. (In inches.)

Stations.	Elevation.	Annual rainfall.			Average monthly.		Annual No. of days with rain of 0.01 inch or more.		
		Average.	Highest.	Lowest.	Wettest.	Driest.	Average.	Highest.	Lowest.
Coast stations:	ft.								
San Juan	82	63.98	78.96	52.03	7.57	2.10	211	226	196
Ponce	50	40.57	58.73	30.12	7.46	0.69	80	95	77
Mayagüez	80	80.07	100.91	46.32	9.87	1.68	186	218	147
Fajardo	15	69.33	87.00	55.58	9.61	2.24	187	236	134
Inland stations:									
Aibonito	2,000	65.41	89.67	39.51	7.69	3.33	158	180	133
Barros	2,000	76.72	117.81	61.54	8.89	3.32	157	201	93
Cayey	1,300	68.38	98.66	35.89	8.35	2.61	169	198	133
Coamo	250	52.43	97.56	21.42	6.81	1.48	86	128	33
Lares	1,400	92.33	102.55	83.37	10.50	2.94	139	160	119

Humidity.—The feeling of lassitude which is common to warm, moist climates is to a great extent dissipated in Porto Rico by the persistent flow of the trade winds throughout the day and night, supplemented by the daily play of the land and sea breezes. While the large amount of moisture in the atmosphere becomes oppressive during periods when the winds fail, it is extremely favorable to the growth and development of vegetation throughout the year. On the dry south side of the Island the heavy dews of the night and early morning offer some compensation for the lack of rain. The high percentage of humidity also prevents the large and rapid fall of temperature during the night, so characteristic of drier climates. There are no official humidity records available for the drier inland stations of the Island, but the observations at San Juan are typical for the entire coast. The variations in the average humidity from month to month are not large. The average for the entire year is 78 per cent; during the driest month, March, it is 75 per cent, and during the most humid months of October and November, it is 81 per cent. At interior stations, especially at the higher elevations, the atmosphere is much drier. The relative humidity, of course, varies greatly during the course of the day, falling as the temperature rises with the advance of the day, and rising with the diminishing temperature of the night. The diurnal fluctuations are usually between 87 per cent in the early morning hours and 67 per cent in the middle of the day. The average during the day is about 70 per cent, and during the night 85 per cent.

Sunshine and Cloudiness.—While days with rain are frequent; and the rains are frequently heavy, there is an abundance of sunshine throughout the year in all portions of the Island. An inspection of the record of the comparative frequency of clear, partly cloudy and cloudy days will show a remarkable preponderance of clear and partly cloudy days over cloudy days. The record for San Juan, where hourly observations have been carefully maintained from sunrise to sunset for five years, shows on the average 139 clear days, 158 partly cloudy days, and 68 cloudy days per year. The variations at selected stations on the Island are shown in the following tabular statement:

RECORD OF CLEAR, PARTLY CLOUDY, AND CLOUDY DAYS.

Stations.	Clear.	Partly cloudy.	Cloudy.
Coast stations:			
San Juan	139	158	68
Ponce	125	168	72
Mayagüez	95	189	81
Humacao	170	42	153
Inland stations:			
Barros	220	108	37
Cayey	224	82	59
Coamo	216	53	96
Corozal	186	109	70
Lares	220	63	82

The average cloudiness during the course of the day is remarkably uniform at San Juan. The record of hourly observations for five years shows the following variations in the proportion of sky covered by clouds from hour to hour during the course of the day, 100 per cent representing a sky entirely overcast:

7 a. m.	8	9	10	11	noon.	1 p. m.	2	3	4	5	6	
47	46	45	43	42	41	42	43	45	46	48	48	per cent.

This shows the sky to be, on the average, clearest at noon, but the slight variations are surprising. The variations in cloudiness during the course of the year show a maximum of 55 per cent in September and a minimum of 36 per cent in March, with an average for the year, at San Juan, of 45 per cent.

THE TRADE WINDS.

The trade winds, aided by the daily recurrence along the coasts of the cool, invigorating sea breeze, constitute a beneficent provision in the tropics for counteracting the enervating effects of a high temperature, combined with a large amount of moisture in the atmosphere. This is clearly show during the occasional periods of a few days when the trades fail and light, variable winds prevail, accompanied by sultry and oppressive weather.

The value of the trade winds as an aid to navigation was known to the early voyagers to the West Indies. Reference to the existence of constant winds blowing from the east in certain latitudes may be found in the literature of voyages of the first half of the 16th century. The Jesuit, José de Acosta, devotes several chapters of his classic work, the "Natural and Moral History of the Indies," published in 1590, to descriptions and explanations of these winds, and to the great benefit to be derived from utilizing them in voyages to the New World, as well as the prevailing westerlies of higher latitudes for the return voyages to Europe. The early Spanish navigators called the trades *brises* and the prevailing westerlies of the middle latitues they named *vendavales*. Acosta's explanation of the trades, while receiving general acceptance at the time and long after, had to be discarded in the light of a better understanding of the general movements of the atmosphere, as influenced by the rotation of the earth about its axis. The general circulation of the atmosphere of the globe and the causes which give rise to changes in wind direction and force are now fairly well understood. Over the north Atlantic there is a permanent area of high barometric pressure, or anti-cyclone; in the equatorial belt the pressure is permanently low; the flow of the atmosphere southward toward the equatorial low area constitutes the north Atlantic trades. The rotation of the earth from west to east deflects this wind from a north wind to a northeast, east or southeast wind, depending upon the locality with reference to the center of the area of high pressure. This area of high pressure, while permanently located in the north Atlantic, shifts its position within limited bounds from month to month and from year to year, causing variations in the prevailing direction of the trades; at the same time there are variations in the gradient of pressure, or the difference in pressure, between the center and edges of the high area, causing variations in the velocity of the trades. In Porto Rico the variations in the direction of the wind during the course of the year are from northeast to southeast, with a decided predominance from the east-southeast when recorded to 16 points of the compass, or east if recorded to 8 points only. The only variation from east-southeast (regarding monthly averages only) is likely to occur in July, August and December, when the prevailing direction is more nearly east, and in October, when it is prevailingly southeast.

The *average* velocity is remarkably constant in Porto Rico, the average hourly velocity from month to month not varying more than one mile from the average of 11 miles for the entire year, excepting in July, when it rises to 13 miles per hour, and in October and November, when it falls to 8 or 9 miles.

AVERAGE HOURLY VELOCITY AND PREVAILING DIRECTION OF THE WIND AT SAN JUAN. (Miles per hour.)

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Year.
Velocity.....	11.0	11.2	11.5	11.3	10.8	12.0	12.7	11.8	9.6	7.	9.1	10.2	10.7
Prevailing direction.....	ESE	ESE	ESE	ESE	ESE	ESE	E	E	ESE	SE	ESE	E	ESE

Tropical Storms.—Porto Rico is comparatively free from storms of all kinds. During the summer months a mild type of thunderstorm occurs with more or less frequency, but these storms seldom attain the intensity common to most portions of the United States during midsummer, and they attract little attention from the visitor from the north. The more destructive local storm of the type known as the tornado is almost unknown in the tropics. In the middle latitudes, and particularly in the northern United States, cyclonic storms pass across the country from west to east in all seasons with such frequency as to completely dominate the daily weather conditions; there is a constant succession of approaching, passing and disappearing cyclones. They vary in intensity from shallow barometric depressions which move quietly across the country producing only light winds and gentle showers, to storms of the greatest violence and of great geographical extent, at times covering more than half the area of the United States.

The tropics are singularly free from these cyclonic disturbances during the greater portion of the year, and there is a monotonous recurrence of similar weather conditions, interrupted only by light to heavy showers of short duration, or by the occurrence of a mild type of thunderstorm, or squall. During the months of July to October, however, that portion of the trade-wind belt containing the West India Islands and the Caribbean Sea, is subject to occasional visits from one of the most destructive types of cyclonic storms—the West India hurricane. These storms are similar in form and general character to the temperate region cyclones, but differ from them in being more restricted in area and in moving more slowly. Their general direction is from east to west, within the tropics, being carried along with the general westward drift of the atmosphere. They curve generally in the Gulf of Mexico, or over the Bahama Islands, and then move northward and northeastward, either across the United States, up the east coast or over the Atlantic Ocean, where they can not be distinguished from the temperate region cyclones.

The recorded storms of this character during the past 400 years number about 450, or an average of a little more than one per year. While they are liable to occur at any time from July to November, over 80 per cent of these storms during the past 40 years have occurred in the months of August, September and October. Porto Rico has been singularly free from the severer types of these storms. Only on three occasions in 40 years did the center of a hurricane pass over the Island—all of these in the month of August, namely, in August of 1891, 1893 and 1899. By far the most destructive of these storms was that of August 8, 1899. The storm of September 12, 1898, passed very close to the south coast.

These storms originate, or first appear within the field of view, in the neighborhood of the Windward Islands, move in a direction between west and northwest at the rate of about 10 or 12 miles per hour, and then recurve to the northward and northeastward, increasing their velocity as they get into higher latitudes. The comparatively slow movement of these storms in the tropics is a fortunate circumstance, as it enables the official forecaster, after once locating the center, and determining the direction of movement, to give ample warning of their approach in the western waters of the Caribbean Sea and in the ports of the Gulf coast.

TABLE IV.—MEAN MONTHLY AND ANNUAL TEMPERATURE.

Number.	Stations.	Elevation in feet.	Number of years.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
1.	Adjuntas	1,700	8	68.7	68.8	68.6	70.4	72.7	73.4	73.3	74.5	74.2	73.2	72.3	70.1	71.8
2.	Alto de la Bandera	2,600	3	69.4	69.4	70.0	73.2	73.2	74.7	74.4	73.9	73.7	73.1	71.3	70.3	72.2
3.	Aguadilla (Coloso)	34	10	74.2	73.8	73.9	76.0	77.8	78.7	79.0	79.4	79.2	78.6	76.6	75.1	76.9
4.	Aguirre	10	10	76.2	75.9	75.9	78.0	80.0	80.4	80.6	81.4	81.3	80.7	79.5	77.2	79.0
5.	Aibonito	2,000	5	67.0	67.6	68.8	70.8	72.3	74.2	75.7	76.1	75.1	74.6	71.1	68.0	71.8
6.	Añasco	25	4	75.5	74.6	75.2	76.2	78.2	78.8	78.8	78.9	78.6	79.0	77.8	75.3	77.3
7.	Arecibo	50	7	73.9	73.7	74.5	75.9	78.2	79.3	79.4	79.7	79.7	78.9	77.3	74.5	77.1
8.	Bacupey and Jobos	1,000	4	70.4	70.4	71.1	72.6	74.5	75.6	77.1	77.4	76.7	76.4	75.0	72.6	74.2
9.	Barros	2,000	7	68.5	68.6	69.3	71.2	73.5	75.5	76.2	76.3	74.5	73.8	72.3	70.4	72.5
10.	Bayamón	75	11	73.7	74.1	74.5	76.1	77.9	78.5	78.9	79.3	79.6	78.9	77.8	75.2	77.0
11.	Caguas	250	11	71.8	72.1	72.7	75.2	77.6	78.4	78.5	78.8	78.5	77.1	75.6	72.7	75.8
12.	Canóvanas	50	11	75.0	75.8	76.5	78.4	80.1	80.5	80.7	80.9	80.7	79.8	78.0	75.7	78.6
13.	Cayey	1,300	10	69.6	70.3	70.5	72.5	74.9	76.8	78.7	78.2	77.0	76.3	74.0	71.8	74.3
14.	Cidra	1,300	10	70.0	71.1	70.6	72.9	74.4	74.8	76.1	76.4	73.4	74.9	73.9	71.0	73.5
15.	Coamo	350	7	73.4	74.4	75.4	76.8	77.4	78.6	80.5	81.1	79.5	79.0	77.9	75.9	77.5
16.	Comerio	500	4	71.4	71.1	70.9	74.0	77.6	77.6	78.2	78.3	78.5	77.6	75.2	73.2	75.3
17.	Corozal	400	11	72.7	73.4	72.9	75.0	76.9	78.0	78.5	78.7	79.1	78.6	76.9	74.3	76.3
18.	Culebra	50	3	76.1	75.8	77.4	78.1	79.8	81.6	81.2	81.3	81.4	80.6	78.9	77.1	79.1
19.	Fajardo	35	11	77.0	76.6	76.8	78.4	80.3	80.9	81.6	82.3	81.4	80.7	79.6	77.2	79.4
20.	Guanica	50	8	73.8	74.5	75.3	76.2	77.8	79.9	79.4	79.9	79.6	78.8	77.2	74.9	77.3
21.	Humacao	60	4	72.6	72.6	74.2	75.6	78.0	78.8	79.2	79.5	79.2	78.5	76.9	74.3	76.6
22.	Isabela	250	11	75.2	75.2	75.5	76.9	78.2	79.4	80.4	80.2	79.8	79.3	78.4	76.3	77.9
23.	Isolina	1,400	11	71.8	71.9	71.5	73.2	74.9	76.5	77.2	77.3	76.8	75.9	74.8	72.6	74.4
24.	Juana Diaz	200	10	76.1	76.0	76.9	78.0	78.8	79.9	80.9	80.9	80.9	80.0	79.0	77.7	78.8
25.	La Carmelita (A)	1,500	7	70.8	71.0	70.8	71.9	72.5	74.5	75.4	75.9	75.1	74.8	73.9	72.4	73.3
26.	Lajas	100	3	74.0	76.5	75.8	76.6	78.5	78.8	79.6	79.2	79.0	77.8	75.9	73.9	77.1
27.	Lares	1,400	7	70.8	70.9	71.8	73.4	75.3	76.6	77.0	77.4	76.7	76.2	74.7	71.8	74.4
28.	Las Marias	1,000	9	72.5	72.8	72.8	73.8	75.7	76.9	77.3	77.6	77.3	76.8	75.8	73.3	75.2
29.	Luquillo (La Perla)	500	8	73.8	74.4	74.8	76.9	79.1	79.6	79.6	80.6	80.0	78.9	77.3	75.6	77.5
30.	Manati	85	11	73.8	74.4	74.7	76.4	78.5	79.6	80.2	80.7	80.1	79.1	77.2	74.7	77.4
31.	Maricao	1,400	3	70.7	69.2	69.8	70.6	72.2	73.6	74.3	75.1	74.9	74.7	73.0	70.9	72.4
32.	Maunabo	40	10	76.6	76.7	77.1	79.0	80.2	81.7	82.2	83.0	81.9	81.2	79.7	77.9	79.7
33.	Mayagüez	50	10	74.4	74.7	75.1	76.4	78.1	78.9	79.2	79.5	79.6	79.2	77.7	75.8	77.4
34.	Morovis	700	8	72.7	72.6	72.4	75.4	77.0	77.8	78.1	78.7	78.1	77.5	76.2	72.8	75.8
35.	Ponce	50	10	75.1	75.0	75.8	77.5	79.1	80.2	80.3	81.2	80.7	80.1	78.8	76.5	78.3
36.	San Juan	100	11	75.3	75.4	75.5	77.2	78.4	80.0	80.2	80.6	80.7	80.1	78.4	76.4	78.2
37.	Rio Blanco	250	6	73.6	74.2	74.7	76.2	77.7	78.6	79.4	79.5	79.1	78.6	77.3	75.2	77.0
38.	San Germán	200	9	73.9	74.4	74.5	75.8	77.6	78.8	80.0	80.1	80.2	79.5	77.9	75.7	77.4
39.	San Lorenzo	200	8	72.9	72.7	73.6	76.2	78.0	78.8	78.8	79.4	79.0	78.0	76.7	73.7	76.5
40.	Santa Isabel	22	9	74.7	74.9	75.6	77.3	78.8	79.9	80.4	81.0	80.5	80.0	78.3	75.7	78.1
41.	Utuado	500	4	73.4	72.6	72.8	75.8	77.8	79.4	80.1	81.2	79.5	79.0	76.9	74.3	77.0
42.	Utuado, San Salvador	1,500	9	70.4	70.2	70.3	71.9	73.9	75.2	75.5	75.7	75.4	75.0	73.2	70.9	73.1
43.	Vieques	45	11	76.1	76.3	76.9	77.8	79.7	80.1	81.1	81.3	81.0	80.7	78.9	76.8	78.9
44.	Yauco	200	10	73.8	74.0	74.4	76.7	79.2	80.0	79.5	80.1	79.9	79.1	77.3	75.2	77.4
	Means			73.0	73.2	73.6	75.3	77.1	78.2	78.7	79.1	78.6	78.0	76.4	74.2	76.3

TABLE V.—MEAN MONTHLY AND ANNUAL RAINFALL.

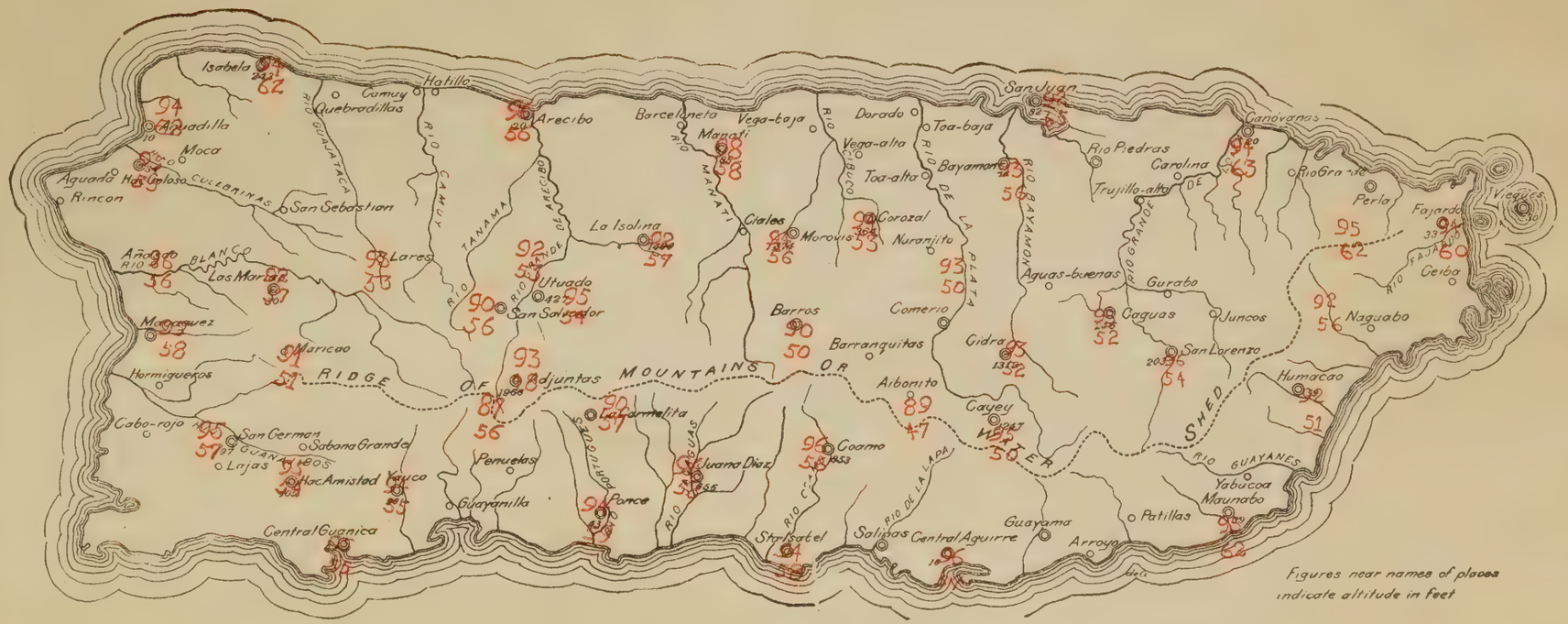
1.	Adjuntas	1,700	9	3.85	1.21	4.03	5.53	8.79	7.48	7.94	12.16	11.03	12.78	8.73	4.91	88.44
2.	Alto de la Bandera	2,600	5	3.26	3.86	4.54	5.54	9.14	7.16	6.56	12.64	13.58	14.66	9.49	4.96	95.39
3.	Aguadilla (Coloso)	35	11	2.11	2.08	3.04	4.55	9.76	12.02	8.78	9.14	9.37	8.72	8.06	2.61	80.29
4.	Aguirre	10	11	1.58	1.04	1.76	2.02	4.29	7.78	5.55	6.20	6.83	7.22	4.23	2.11	50.61
5.	Aibonito	2,000	5	3.93	4.32	4.70	3.33	7.42	4.81	4.10	6.50	7.42	6.68	7.69	4.51	65.41
6.	Arecibo	50	7	3.36	3.08	4.07	3.95	5.49	4.24	4.89	5.36	4.89	5.43	8.09	6.19	59.04
7.	Bacupey and Jobos	1,000	5	3.24	4.65	4.44	5.76	6.17	5.35	3.91	9.11	9.58	6.76	10.28	8.17	77.42
8.	Barros	2,000	8	5.72	3.32	5.48	4.39	10.02	4.74	5.61	4.61	7.91	8.67	8.89	7.36	76.72
9.	Bayamón	75	11	4.41	2.52	4.14	4.64	6.52	8.22	6.50	9.21	7.83	6.92	8.53	6.43	75.87
10.	Caguas	250	11	4.18	2.27	3.31	3.48	4.86	7.85	8.07	7.34	7.21	7.78	6.65	4.87	67.87
11.	Canóvanas	50	20	5.18	2.62	3.61	4.74	6.41	7.13	10.46	8.69	6.93	6.30	9.93	7.54	79.54
12.	Cayey	1,300	11	3.44	2.61	3.26	4.04	5.32	8.36	6.87	8.03	7.17	7.40	7.33	4.52	68.35
13.	Cidra	1,300	11	6.00	4.09	5.21	4.51	6.82	8.65	8.79	10.92	6.48	6.78	7.16	7.43	83.14
14.	Coamo	350	8	3.43	1.48	1.77	3.80	4.26	5.60	3.60	5.97	5.26	6.81	6.43	4.04	52.45
15.	Corozal	600	11	4.84	4.04	4.64	5.53	6.30	6.28	7.15	8.02	7.38	9.09	8.66	6.79	78.72
16.	Fajardo	30	11	3.71	2.24	3.37	4.12	5.47	7.23	6.09	5.96	7.63	8.76	9.61	5.16	69.35
17.	Guanica	15	8	1.28	0.70	1.74	2.56	4.00	4.37	1.94	4.08	4.25	6.01	4.94	1.29	37.16
18.	Guayama	17	9	1.84	1.16	2.20	2.37	5.60	7.94	6.11	4.96	7.61	8.20	5.35	2.02	55.36
19.	Humacao	60	11	4.16	2.32	3.95	5.10	9.40	10.17	7.99	9.55	10.66	9.56	8.37	5.17	86.40
20.	Isabela	250	11	3.14	2.72	2.77	4.17	5.70	4.82	3.39	6.06	5.35	5.59	8.66	5.48	57.85
21.	Isolina	1,400	11	4.78	4.21	6.34	6.46	12.28	7.24	5.88	8.79	11.25	8.75	10.35	8.52	94.85
22.	Juana Diaz	200	11	0.94	0.64	1.63	2.64	4.66	5.66	4.23	5.87	6.75	8.68	5.86	1.80	49.36
23.	La Carmelita (A)	1,500	7	3.17	3.06	5.86	6.60	10.86	7.64	7.25	12.26	13.52	14.86	12.53	4.26	101.87
24.	La Carmelita (B)	2,500	7	4.52	4.04	6.73	7.09	12.23	7.50	7.73	13.24	14.11	16.08	13.09	6.36	112.72
25.	Lares	1,400	7	2.94	3.72	5.24	7.53	10.50	8.68	8.12	10.16	9.09	10.43	10.21	5.70	92.32
26.	Las Marias	1,000	9	3.14	2.65	6.19	6.94	14.08	10.56	10.18	13.14	13.55	12.17	10.71	4.46	107.77
27.	Luquillo La Perla (A)	500	9	7.22	3.04	6.29	10.60	14.98	13.57	15.15	11.56	11.83	14.28	16.22	9.48	134.22
28.	Luquillo La Perla (B)	1,200	9	8.21	3.39	6.54	11.27	14.94	13.75	14.56	11.14	12.24	13.94	16.23	9.36	135.57
29.	Manati	85	11	3.76	3.46	4.95	4.92	4.85	5.05	6.09	5.65	6.84	6.59	9.86	7.43	69.45
30.	Maunabo	40	11	4.33	3.11	3.97	3.30	7.20	10.71	7.66	7.99	9.16	11.13	8.10	5.30	81.96
31.	Mayagüez	50	11	2.30	1.89	3.70	5.17	8.60	9.32	10.85	10.72	9.28	8.65	6.80	2.79	80.07
32.	Morovis	375	9	5.25	3.38	6.38	5.74	8.35	5.63	6.46	11.06	8.61	10.01	8.62	7.70	87.19
32.	Ponce	50	11	1.00	0.69	1.38	1.99	3.17	5.48	3.47	5.25	5.75	7.46	3.81	1.12	40.57
34.	Rio Blanco	150	6	5.04	5.82	6.36	5.85	10.56	12.58	10.96	12.17	13.36	12.10	10.99	7.30	113.09
35.	Rio Piedras	75	8	3.90	3.07	4.16	4.31	6.23	6.68	6.25	8.47	7.69	6.19	7.04	7.07	71.06
36.	San Germán	200	11	2.24	2.29	3.69	6.20	5.81	6.17	5.49	7.86	6.38	9.06	8.99	3.94	68.12
37.	San Juan	100	11	4.52	2.10	3.17	3.85	4.79	6.20	6.47	7.44	6.36	6.11	7.57	5.40	63.98
38.	San Lorenzo	200	10	3.19	2.40	4.25	4.54	6.98	12.64	9.58	8.00	10.14	9.43	7.04	5.08	83.27
39.	Santa Isabel	22	9	1.24	0.75	1.31	1.59	4.95	4.40	3.67	3.80	5.56	6.59	4.65	2.16	40.67
40.	Utuado	500	5	3.43	0.46	3.00	5.48	11.32	8.57	5.07	8.75	10.83	10.13	10.32	4.58	81.94
41.	Utuado (San Salvador)	1,500	9	3.83	2.22	4.80	5.24	9.60	5.64	5.49	7.71	11.11	8.53	10.55	5.29	80.11
42.	Vieques	45	7	2.41	2.13	2.23	1.64	3.38	4.66	4.31	5.86	6.90	7.49	4.46	3.12	48.59
43.	Yabucoa	100	8	4.64	3.63	3.78	4.41	8.16	10.13	7.06	9.66	12.32	10.36	8.50	5.05	87.70
44.	Yauco	200	11	2.13	0.99	2.61	3.19	4.48	5.28	3.87	5.84	5.70	6.82	5.33	1.76	48.00
	Means			3.65	2.62	4.01	4.79	7.61	7.59	6.82	8.34	8.70	9.00	8.53	5.15	76.81

TABLE VI.—METEOROLOGICAL SUMMARY FOR PORTO RICO, 1899-1909.

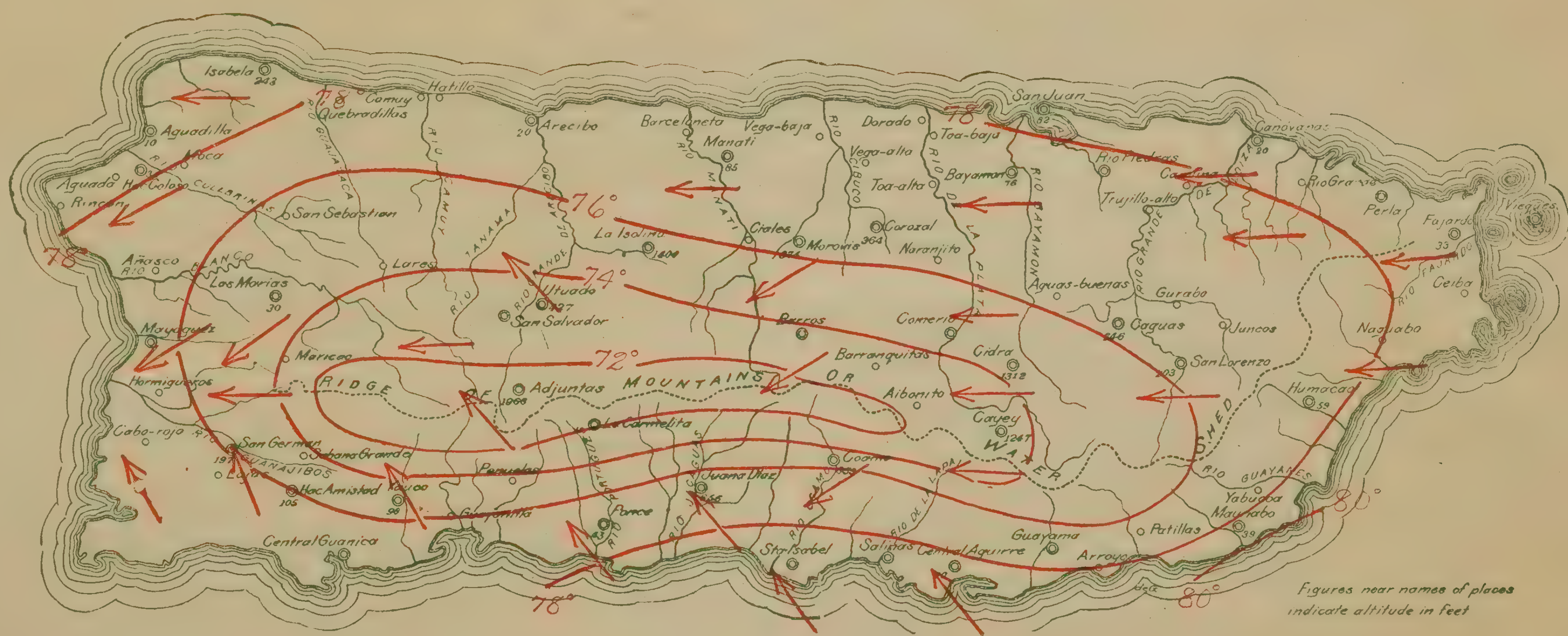
Latitude: 18 deg. to 18 deg. 30 min. N. Longitude: 65 degs. 30 min. to 67 deg. 10 min. W. Average altitude: 800 feet.
Observations made under direction of the United States Weather Bureau.

Month.	Temperature, in degrees Fahrenheit.						Rainfall, in inches.				Number of days with rain.			Number of days—			Prevailing direction of the wind.
	Mean.	Highest mon. mean.	Lowest mon. mean.	Average daily range.	Extreme maximum.	Extreme minimum.	Average.	Greatest monthly.	Least monthly.	Greatest in 24 hours.	Average.	Greatest.	Least.	Clear.	Partly cloudy.	Cloudy.	
January	73.2	74.2	72.0	19.6	97	45	3.67	7.83	1.54	8.10	13	25	3	16	9	6	NE
February	73.3	75.3	71.2	20.1	98	43	2.63	4.51	0.51	3.50	10	22	2	16	8	4	E
March	73.7	75.7	71.7	20.4	98	43	4.00	7.38	1.85	9.32	12	23	4	16	9	6	E
April	75.4	77.5	74.2	19.8	99	48	4.79	7.69	1.16	12.23	11	20	4	16	9	5	E
May	77.2	79.3	75.8	17.8	99	48	7.59	13.78	4.58	7.83	15	23	5	13	10	8	E
June	78.2	79.7	76.6	18.0	100	49	7.57	16.12	3.92	9.06	15	24	6	13	10	7	E
July	78.8	79.9	78.3	18.2	99	50	6.81	12.73	4.96	17.02	15	25	4	14	10	7	E
August	79.1	80.6	78.4	18.3	103	52	8.31	16.11	5.18	23.00	16	29	6	14	10	7	E
September	78.5	80.4	78.3	18.5	101	51	8.68	10.79	6.49	18.22	16	28	8	12	10	8	E
October	78.0	79.4	77.6	18.8	100	52	8.91	12.64	5.13	6.60	17	29	10	12	11	8	E
November	76.5	78.3	75.9	18.4	98	46	8.54	13.90	5.46	12.90	15	28	6	13	10	7	E
December	74.2	76.3	72.6	18.4	97	46	5.14	8.11	1.68	7.50	14	29	4	16	9	6	E
Annual means: Average	76.4	.....	.....	18.9	.....	.....	77.30	.....	.....	.....	169	.....	.....	171	115	79	E
Annual means: Highest	77.8	.....	.....	.....	.....	.....	93.72	.....	.....	.....	292	.....	.....	186	137	95	.....
Annual means: Lowest	75.6	.....	.....	.....	.....	.....	64.18	.....	.....	.....	66	.....	.....	150	98	59	.....

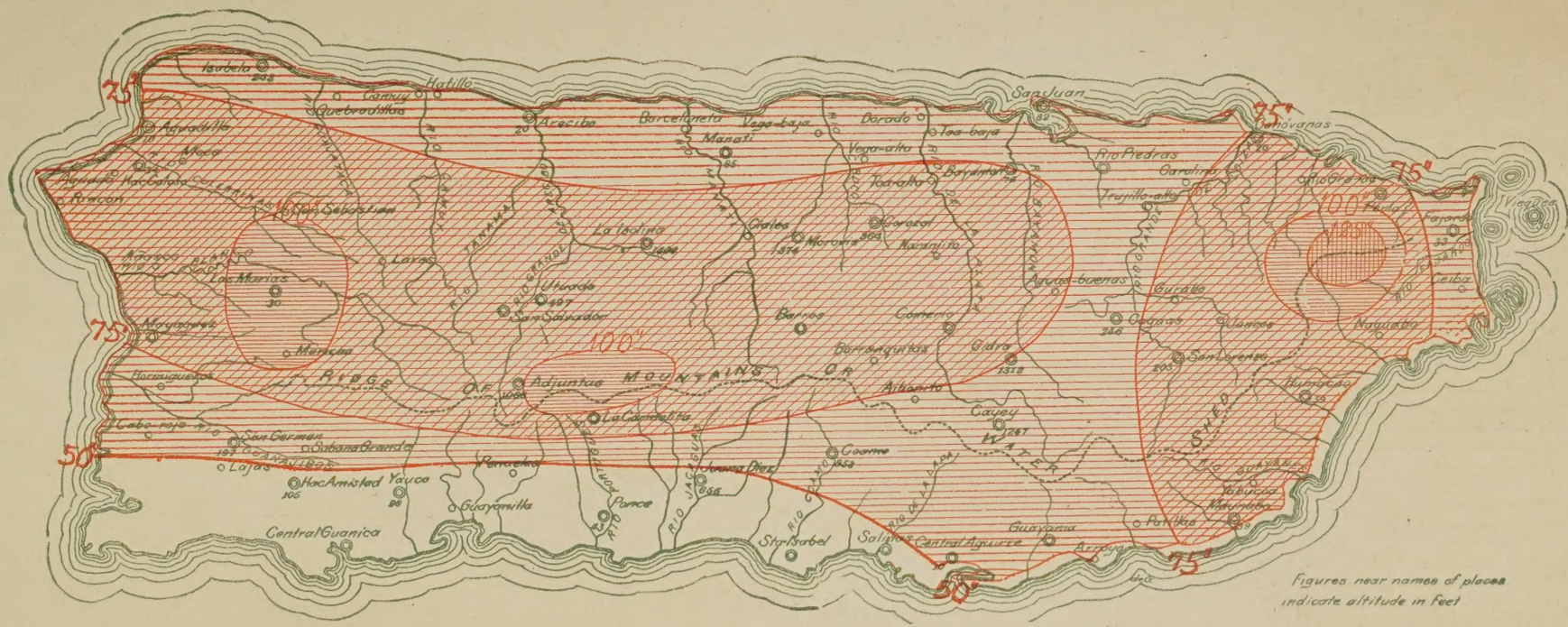
AVERAGE ANNUAL EXTREMES OF TEMPERATURE IN PORTO RICO.



MEAN ANNUAL TEMPERATURE AND PREVAILING WIND DIRECTION IN PORTO RICO.



AVERAGE ANNUAL RAINFALL, 1900-1909.

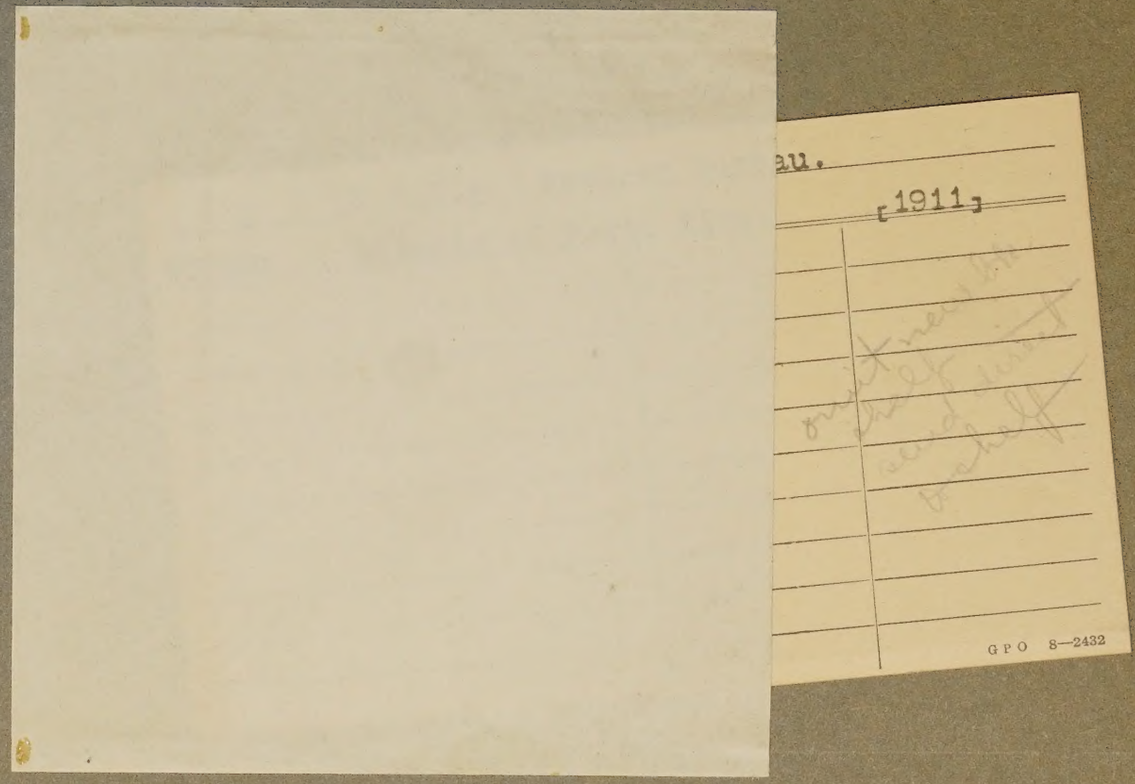


Figures near names of places indicate altitude in feet

SCALE OF SHADES—Inches.

Less than 50.	50 to 75.	75 to 100.	100 to 125.	Over 125.

Diagram showing the comparative monthly distribution of precipitation in Porto Rico.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